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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/709,776	05/27/2004	William G. America	FIS920040083US1	3775

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EXAMINER
IM, JUNGHWA M

ART UNIT	PAPER NUMBER
2811	

DATE MAILED: 06/05/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/709,776	AMERICA, WILLIAM G.	
	Examiner	Art Unit	
	Junghwa M. Im	2811	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 March 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-7 and 21-26* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-7 and 21-26* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjorkman et al. (US 6340435), hereinafter Bjorkman view of Colombo et al. (US Pub. 2003/0109146), hereinafter Colombo.

Regarding claim 1, Fig. 2H of Bjorkman shows a semiconductor device comprising:

a substrate [50] including silicon (col. 3, lines 12-15);

a dielectric layer [46, 42, 40, 44] atop the substrate, the dielectric layer including a first sub-layer [42] , a second sub-layer [40] and wherein the first sub-layer has an etch resistance different than the second sub-layer (col. 7, lines 49-57); and

an opening [an opening formed only in the layer 44] extending no deeper than the sub-layer nearest the substrate.

Fig. 2H of Bjorman shows most aspect of the instant invention except "a first non-discrete transitional sub-layer residing between the first and second sub-layer." Fig. 1 of Colombo shows a non-discrete transitional sub-layer [14b] residing between the first [12] and second layer [14a] (paragraphs [0005]-[0006]).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Colombo into the device of Bjorkman in order to have

a non-discrete transitional sub-layer residing between the first and second sub-layer to form a second sub-layer to be as pure as possible.

Regarding claim 2, Bjorkman discloses that an etch resistance of the first sub-layer is greater than an etch resistance of the second sub-layer (col. 7, lines 49-57).

Regarding claim 3, Bjorkman discloses that the first sub-layer has a greater content of at least one of carbon and fluorine than the second sub-layer (col. 2, lines 61-64).

Regarding claim 4 and 5, Bjorkman discloses the first sub-layer includes at least one component not included in the second sub-layer, the at least one component being selected from a group consisting of fluoroalkylsilanes, fluoralkylsiloxanes, perfluoroalkylsilanes, perfiuoroalkylsiloxanes, alkylsilanes, and allcylsilaxanes while the at least one component is selected from a group consisting of rnethyls.ilane, dimethylsilane, trimethylsilane, trifluorvmethylsilane, 1,2-disitanotetrafluorethylene, 1,3-bis(silanodifluoromethylene)disiloxane, 2,2-disilanohexafluorosilane, bis(trifluoromethyfdisiloxanyl)difluormethane, octamethylcyclotetrasiloxane, and tetramethylcyclotetrasiloxane (col. 10, lines 15-54).

Regarding claim 6, Fig. 2H of Bjorkman shows the dielectric layer includes a third sub-layer [46] residing between the substrate and the first sub-layer, however, fails to show that "a second non-discrete transitional sub-layer residing between the third sub-layer and the first sub-layer." Fig. 1 of Colombo shows a non-discrete transitional sub-layer [14b] residing between two layers [12, 14a] (paragraphs [0005]-[0006]).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Colombo into the device of Bjorkman in order to have

a non-discrete transitional sub-layer residing between the second and third sub-layer to form a second sub-layer to be as pure as possible.

Regarding claim 7, Bjorkman discloses the second sub-layer and the third sub-layer have substantially the same etch resistance (col. 8, lines 8-13 and col. 9, lines 45-50).

Claims 21-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bjorkman view of Colombo and Todd (US 6733830).

Regarding claim 21, , Fig. 2H of Bjorkman shows a semiconductor device comprising:

a substrate [50];

a dielectric layer [46, 42, 40, 44] atop the substrate, the dielectric layer including a first sub-layer [42] , a second sub-layer [40] and wherein the first sub-layer has an etch resistance different than the second sub-layer (col. 7, lines 49-57); and

an opening [an opening formed only in the layer 44] extending no deeper than the sub-layer nearest the substrate.

Fig. 2H of Bjorman shows most aspect of the instant invention except "a first non-discrete transitional sub-layer residing between the first and second sub-layer." Fig. 1 of Colombo shows a non-discrete transitional sub-layer [14b] residing between the first [12] and second layer [14a] (paragraphs [0005]-[0006]).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Colombo into the device of Bjorkman in order to have a non-discrete transitional sub-layer residing between the first and second sub-layer to form a second sub-layer to be as pure as possible.

The combined teachings of Bjorkman and Colombo fail to teach that wherein the first sub-layer includes at least one component not included in the second sub-layer, the at least one component being selected from a group consisting of fluoroalkylsilanes, fluoralkylsiloxanes, perfluoroalkylsilanes, perfiuoroalkylsiloxanes. Todd discloses that dielectric material includes fluoroalkylsilanes, fluoralkylsiloxanes, perfluoroalkylsilanes, perfiuoroalkylsiloxanes (col. 21, lines 55-60).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Todd into the device of Bjorkman and Colombo in order to have dielectric material including fluoroalkylsilanes, fluoralkylsiloxanes, perfluoroalkylsilanes, perfiuoroalkylsiloxanes to accommodate the desired dielectric constant.

Regarding claim 22, Bjorkman discloses that an etch resistance of the first sub-layer is greater than an etch resistance of the second sub-layer (col. 7, lines 49-57).

Regarding claim 23, Bjorkman discloses that the first sub-layer has a greater content of at least one of carbon and fluorine than the second sub-layer (col. 2, lines 61-64).

Regarding claim 24, Bjorkman discloses the at least one component is selected from a group consisting of rnethylsiilane, dimethylsilane, trimethylsilane, trifluorvmethylsilane, 1,2-disitanotetrafluorethylene, 1,3-bis(silanodifluoromethylene)disiloxane, 2,2-disilanohexafluorosilane, bis(trifluoromethyfdisiloxanyl)difluormethane, octamethylcyclotetrasiloxane, and tetramethylcyclotetrasiloxane (col. 10, lines 15-54).

Regarding claim 25, Fig. 2H of Bjorkman shows the dielectric layer includes a third sub-layer [46] residing between the substrate and the first sub-layer, however, fails to show that "a second non-discrete transitional sub-layer residing between the third sub-layer and the first

sub-layer." Fig. 1 of Colombo shows a non-discrete transitional sub-layer [14b] residing between two layers [12, 14a] (paragraphs [0005]-[0006]).

It would have been obvious to one of ordinary skill in the art at the time of the invention was made to incorporate the teachings of Colombo into the device of Bjorkman in order to have a non-discrete transitional sub-layer residing between the second and third sub-layer to form a second sub-layer to be as pure as possible.

Regarding claim 26, Bjorkman discloses the second sub-layer and the third sub-layer have substantially the same etch resistance (col. 8, lines 8-13 and col. 9, lines 45-50).

Response to Arguments

Applicant's arguments filed March 14, 2006 have been fully considered but they are not persuasive.

Applicant argues that the substrate of Bjorkman is a lower dielectric, therefore not a substrate, in particular not a substrate including silicon. Examiner disagrees. Substrate is in general defined as an underlying support or foundation. Fig. 2H of Bjorkman shows that the dielectric layer 50 is an underlying foundation wherein the dielectric layers and the interconnects are formed atop. In addition, Bjorkman discloses through the specification, in particular col. 3, lines 12-15, that all the dielectric layers have silicon stated in the office action above. Furthermore, Bjorkman discloses that the dielectric layer 50 is formed on the semiconductor substrate (col. 11, lines 34-36).

Applicant argues that Colombo does not show that "a first non-discrete transitional sub-layer residing between the first and second sub-layer." Note that Bjorkman shows most

aspect of the claimed structure except "a non-discrete transitional sub-layer residing between the first and second sub-layer." Colombo is referred to complement the deficiency of Bjorkman's structure, a non-discrete transitional sub-layer between the two adjacent layers. And Colombo shows a non-discrete transitional sub-layer between the two adjacent layers.

In response to Applicant's argument that there is no suggestion to combine the references, the Examiner recognizes that references cannot be arbitrarily combined and that there must be some reason why one skilled in the art would be motivated to make the proposed combination of primary and secondary references. In re Nomiya, 189 USPQ 607 (CCPA 1975). However, there is no requirement that a motivation to make the modification be expressly articulated. The test for combining references is what the combination of disclosures taken as a whole would suggest to one of ordinary skill in the art. In re McLaughlin, 170 USPQ 209 (CCPA1971). References are evaluated by what they suggest to one versed in the art, rather than by their specific disclosures. In re Bozek, 163 USPQ 595 (CCPA) 1969.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period

will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Junghwa M. Im whose telephone number is (571) 272-1655. The examiner can normally be reached on MON.-FRI. 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on (571) 272-1732. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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